Abstract:

GCB Pqbbi e^p absbilmba Kf^aaba efde `loolpflk obpfpq^kq tb^qebofkd pqbbip tef`e bum^ka qeb o^kdb lc ^mmif`^qflk lc tb^qebofkd pqbbip tefib obar`fkd qeb ifcb `v`ib `lpq %I@@& lc _ofadbp) ^ka ^ `loolpflk bpqfj ^qflk qb`eklildv ^ka orpq pq^_fifw^qflk qob^qjbkqp ^p ^mmif`^* qflk qb`eklildfbp clo qebpb tb^qebofkd pqbbip+ >k lrqifkb lc qebpb molar`qp ^ka qb`eklildfbp fp mobpbkqba fk qefp m^mbo+ Fk qeb ªbia lc tb^qebofkd pqbbip) GCB Pqbbi e^p absbilmba qtl ^as^k`ba Kf*^aaba tb^qebofkd pqbbip tef`e bk^_ib I@@ obar`qflk fk efde ^fo_lokb p^iq bksf* olkjbkqp+ GCB*>@I Qvmb . fp ^ .+2 "Kf*-+0 " J l pqbbi tef`e `lkpfabop b`lkljv tefib j^fkq^fkfkd obpfpq^k`b ql p^iq `loolpflk+ GCB*>@I Qvmb / fp ^k riqo^*ilt @* /+2 "Kf pqbbi tfqe efdebo obpfpq^k`b ql ^fo_lokb p^iq+ Ql prmmloq qeb lmqfjrj ^mmif`^qflk lc tb^qebofkd pqbbip fk _ofadbp) qeb `ljm^kv ^ipl absbilmba ^ kbt plcqt^ob) _^pba lk slirjfklrp bumlprob a^q^) tef`e j^hbp fq mlp* pf_ib ql bpqfj^qb qeb qef`hkbpp ilpp lc tb^qebofkd pqbbi arb ql ^qjlpmebof` `loolpflk lsbo qeb ifcbqfjb lc qeb _ofadb+ Rpfkd qefp plcqt^ob) fq fp mlppf_ib ql molmlpb qeb jlpq prfq^_ib tb^qebofkd pqbbi clo qeb ^`qr^i _ofadb il`^qflk+ Qtl kbt proc^`b qob^qjbkq qb`eklildfbp tef`e mol jlqb molqb`qfsb orpq cloj^qflk tefib j^fkq^fkfkd qeb dlla ^mmb^o^k`b lc _ofadbp tbob ^ipl absbilmba ^ka `ljjbo`f^ifwba+ @RMQBK @L>Q J fp ^ .*`l^q molar`q tfqe bu`biibkq `l^q^_fifqv) tefib b*ORP jbbqp qeb kbba clo obif^_ib b^oiv cloj^qflk lc molqb`qfsb orpq+ Qebpb orpq pq^_fifwfkd qob^qjbkqp molmlpba _v GCB Pqbbi ^ob bksfolkjbkq*cofbkaiv) `lkq^fkfkd kl bksfolkjbkq^i il^a pr_pq^k`bp pr`e ^p @o ^ka M_+ >p ^ ^aafqflk^i ^as^k* q^db) qebpb orpq pq^_fifwfkd qob^qjbkqp `^k ^ipl _b ^mmifba ^p ^ mofj ^ov mofjbo rpfkd ^ mob*`l^q qob^qjbkq pvpqbj ^q qeb mi^qb jfii) qebob_v obar`fkd `l^qfkd `lpqp+*

1. Introduction

The use ratio of weathering steels in steel bridges has increased rapidly, approximately tripling in the last 10 years, and now exceeds 15%[1)]. The background to this dramatic increase includes (1) social conditions which require materials that reduce the life cycle cost (LCC)

3.1 Corrosion Estimation System for Weathering Steels

It is important to determine in a simple manner the corrosion resistance method which will enable the greatest reduction in LCC in the actual construction environment and to reflect this quickly in the design of the bridge structure. As a method which meets this requirement, JFE Steel developed software for calculating corrosion of weathering steels at any desired bridge construction site in Japan using the corrosion test results discussed in section 2.2. An outline is presented below.

With this software, it is possible to reflect the influ

Photo 4 Appearance of mock-up bridge treated by e-RUS and rust outflow on plaster board after 3 year-exposure in coastal area

and e-RUS, in addition to shop coating after bridge fabrication and site coating, both of these treatments can be applied as pre-coat treatments at the plate mill before the plates are shipped. **Figure 7** shows the pre-coat treatment system. As with existing primary primer treatments, pre-coat weathering steels with a thin film of rust stabilization treatment do not dirty the work site as a result of primary rust-proofing during storage and allow application of the final top coat after only simple surface preparation. **Figure 8** shows an example of the cost composition for work in conventional shop coating. Because surface preparation accounts for a large percentage of coating costs, application of the pre-coat treatment system, which makes it possible to simplify the product blasting process, can be expected to reduce coating costs.

Photos 5 and **6** show bridges in which CUPTEN COAT M and e-RUS pre-coat treatment steel products

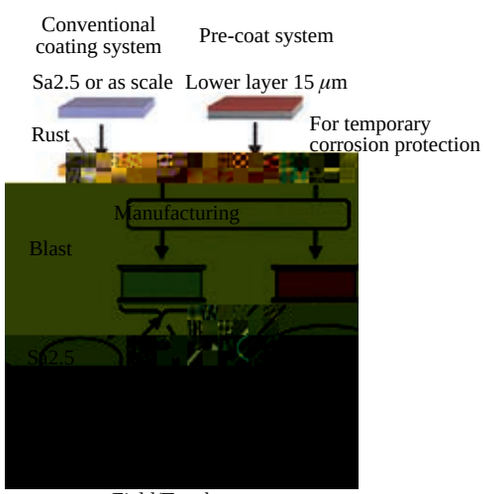

Fig. 7 Pre-coat system of new surface treatment

Photo 5 Appearance of World-cup-kyo Bridge applied with CUPTEN COAT M treatment and pre-coat system (Yokohama City)

Photo 6 Appearance of Maruyama-bashi Bridge applied with e-RUS treatment and pre-coat system (Okaya City)

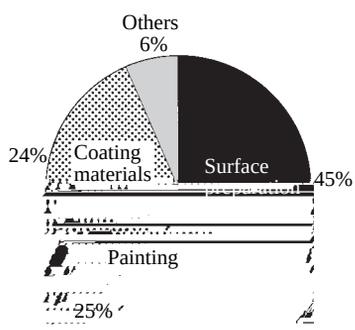

Fig. 8 Example of cost composition for conventional coating system

were applied. Because a reductions in LCC and coating costs can be expected when the pre-coat treatment system is adopted, increasing use is considered probable in the future.

4. Conclusion

JFE Steel's weathering steels for bridges and related application technologies were described. The developed Ni-added high corrosion resistant weathering steels have high resistance to salt corrosion and provide corrosion resistance in environments with high concentrations of airborne salt exceeding 0.05 mdd, where the conven-

tional JIS SMA could not be used, and are expected to reduce the life cycle cost (LCC) of bridges. New software using a corrosion life estimation technology makes it possible to select the optimum weathering steel material for the actual construction site at the time of bridge design. JFE Steel's rust stabilization treatments, which preserve the scenic beauty of weathering steel bridges, are both environment-friendly types, and when used together with the pre-coat treatment system, make it possible to reduce bridge coating costs. With the trend toward cost reduction in public works projects and high priority attached to LCC, weathering steels will play an increasingly large role. The developments described in this report are expected to make a large contribution to expanding the application of weathering steels not only in bridges, but also in other fields.

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